

PHYSIOTHERAPY MANAGEMENT IN SPASTICITY

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Effects of Spasticity (ICF Model)

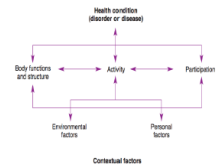
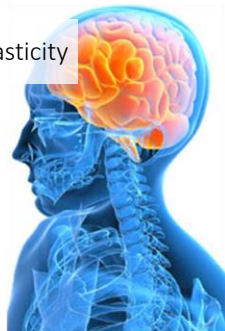


Fig 1 The International Classification of Functioning, Disability and Health

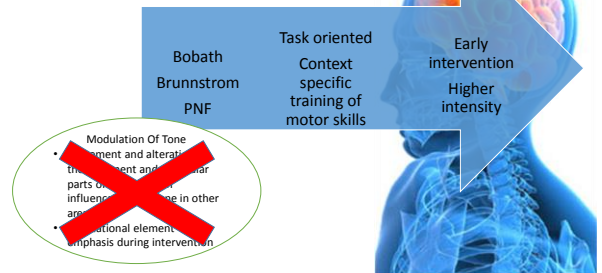
ICF level	Problem	Effect
Impairment	Muscle spasms	Pain Difficulty with seating and posture
	Abnormal trunk and limb posture	Fatigue Contractures Pressure sores
Activity	Pain	Deformity Dis ease and low mood Poor sleep patterns
	Active function loss	Reduced mobility Inability to use limbs in function Difficulty with sexual intercourse
Participation	Passive function loss	Difficulty with self-care and hygiene Increased carer burden
	Impact of any/all of the above	Poor self-esteem/self image Reduced social interaction Impact on family relationships

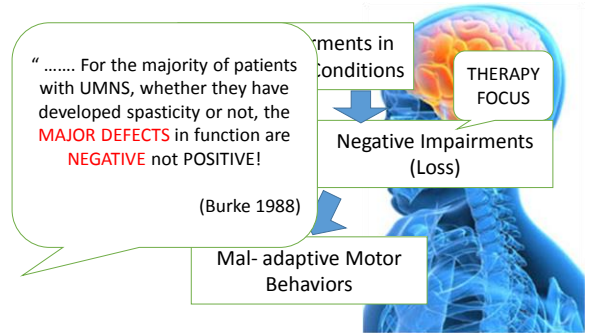
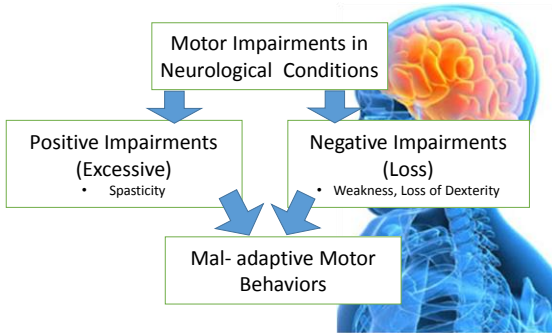
Functional Assessment of Spasticity

- 10m Walk test (Cadence, step length and speed)
- 6 Minute Walk Test
- Functional reach test
- 30s Chair Rise
- Time up and Go (TUG)
- Barthel Index
- Nine-hole peg test.



Current Approaches in Rehab





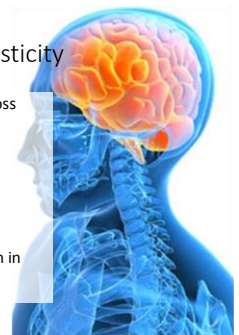
Clinical Guidelines for Stroke Management 2010

National Stroke Foundation

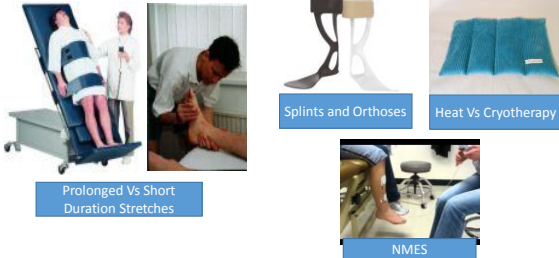
Recommendations	Grade
Spasticity	
In addition to general therapy (eg, task specific practice) other interventions to decrease spasticity should NOT be routinely provided for people with stroke who have mild to moderate spasticity (ie, spasticity that does not interfere with their activity or personal care).	✓
In people with stroke who have persistent, moderate to severe spasticity (ie, spasticity that interferes with their activity or personal care):	
• botulinum toxin A should be trialled in conjunction with rehabilitation therapy which includes setting clear goals (Rosales & Chua-Yap, 2008; Eila et al, 2009; Garces et al, 2006)	B
• electrical stimulation in combination with EMG biofeedback can be used (Bakhtiyar & Fatemy, 2008; Yan & Hui-Chan, 2009).	C

Aims of Physiotherapy in Spasticity

- maintain muscle and soft tissue length across joints
- facilitate care giving (passive functional improvements)
- facilitate active control of any residual movements to allow for active participation in tasks (active functional improvements).



Physiotherapy Management of Spasticity



Physiotherapy Management of Spasticity

Task Specific Functional Re- training

Stretching

- A process of elongation
- Mechanism: change the muscle's viscoelastic, structural, and excitability properties. (Bovend et al)



Sign (2013) guideline recommends Grade C based on 5 SR but...



Study and Design	Subjects	Intervention	Outcome Measures	Results	Level of Evidence/Profilo
Shahar et al. 2005, RCT	-Stroke -Healthy control	A single 20 minutes stretch 1. Isometric stretch with weight bearing; maximum dorsiflexion, constant angle, 10 table 2. Isometric stretch without weight bearing; maximum dorsiflexion, constant angle, 10 table 3. Ballistic stretch, maximum plantar to dorsiflexion, constant velocity, 10 table, 10 table	Hoffmann Index	No significant difference in 10/10 ratio and 10 index latency between group and at immediate and 3 hr	Petrov-10 Level-1a
De Jaeg et al. 2006, RCT	stroke	1. Experimental: conventional rehabilitation + positioning of the arm in shoulder abduction, external rotation, elbow extension and forearm supination. Posturing with optimal use of reaching 1-4h stretching program, twice daily on weekdays, 30-min sessions 2. Control: Conventional rehabilitation, no stretch	-ROM -Ashworth Scale -FMA -Barthel Index	- Decrease in all shoulder range in both group -Shoulder abduction contracture was lowered down in the experimental group - slight increase in MAS in both gpy -No significant changes in Ashworth Scale, FMA, and Barthel Index - - - - -	Petrov-9 Level-1a

Study and Design	Subjects	Intervention	Outcome Measures	Results	Level of Evidence/Pedro
Hale et al. 1995 RCT	-Stroke, HI, MS -spasticity of 1 or both quadr.	-Mechanical stretch by volitional -dynamic nature of the spasticity; -1 session of 2, 1) and 30 min.	- Subject's perceived spasticity -Ashworth Scale -Prabakaran Test with Cohen (relaxation index)	Perceived spasticity and Ashworth Scale score significantly improved with all 3 stretches The relaxation index improved most after 10-min stretch	Level=2 Pedro=6
Rocheveteau et al. 2000 RCT	-MS, stroke, SCI, TBI -spastic spasticity	1. Eccentric muscle contractions, 6 x (1) eccentric contractions followed by 30 s rest 2. Eccentric muscle contractions + + eccentric contractions with 5s stretch after each contraction, x -1 session: - from 30° plantarflexion to 20° dorsiflexion at a velocity of 30°/sec	H-reflex	Eccentric contractions resulted in a significant increase of the H-reflex, whereas eccentric contraction + stretch did not significantly change the H-reflex	Level=2 Pedro=6

Study and Design	Subjects	Intervention	Outcome Measures	Results	Level of Evidence/Pedro
Yeh et al. 2005 RCT	Stroke -spasticity in lower limbs	A single 30 minute stretch 1. Constant torque prolonged mechanical ankle stretch, at 80% of torque at maximum passive dorsiflexion 2. Constant angle stretch, at maximum passive dorsiflexion	-MAS -ROM -Reactive torque	● Both passive ROM increased significantly ● Both MAS decreased significantly ● Both elastic and viscous components of reactive force decreased significantly in both groups, however, they	Pedro=4 Level=2

NO Concluding evidence on
1) How much stretch?
2) What kind of stretch?

General Guidelines
Short duration stretches: 30s → 6 mins/ day
Long duration stretches: 30 mins / day

Can Spasticity be Useful?

- Spasticity does not ALWAYS cause HARM!
- Occasionally it can assist in the rehabilitation process

Eg enabling a hemiplegic patient to stand when their limb weakness would not otherwise allow it.



Are Strengthening Interventions Harmful?



Traditional Views of Strength training

Bobath

- Reflex/hierarchical theory
- Strength training increases spasticity.
- Movement is controlled by chained reflexes
- Reflexes are controlled by a rigid CNS hierarchy
- Motor dyscontrol is caused by CNS lesions
- Treatment is directed at re-establishing CNS hierarchy
- Re-establishing CNS hierarchy will produce normal movement which will automatically transfer to functional ability



This view is not supported by EVIDENCE!!

Are Strengthening Interventions Harmful?

Effect of Resisted Exercise on Muscular Strength, Spasticity and Functionality in Chronic Hemiparetic Subjects: A Systematic Review

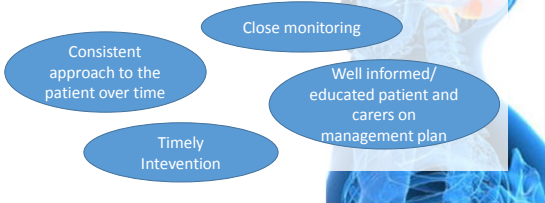
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 José Eduardo Pompeu⁴
 Thiago Yukio Fukuda⁵

CONCLUSION

After the analysis of research studies, it was possible to verify that resisted exercise did not promote tonus increase in the trained subjects, yet presented beneficial effects in relation to the power of spastic muscles. In addition, this can be an important tool in physical therapy treatment when a subject's functionality is emphasized.

Management of Spasticity

- A coordinated multidisciplinary team is KEY to successful spasticity management!



Take Home Messages

- Exercises prescribed for patients +/- SPASTICITY should be TASK-SPECIFIC and FUNCTIONAL.
- Progressive Resistive Strength Training reduces impairment and increases strength and function in patients with neurological dysfunction
- Strength training patients with neurological dysfunction will NOT increase spasticity

